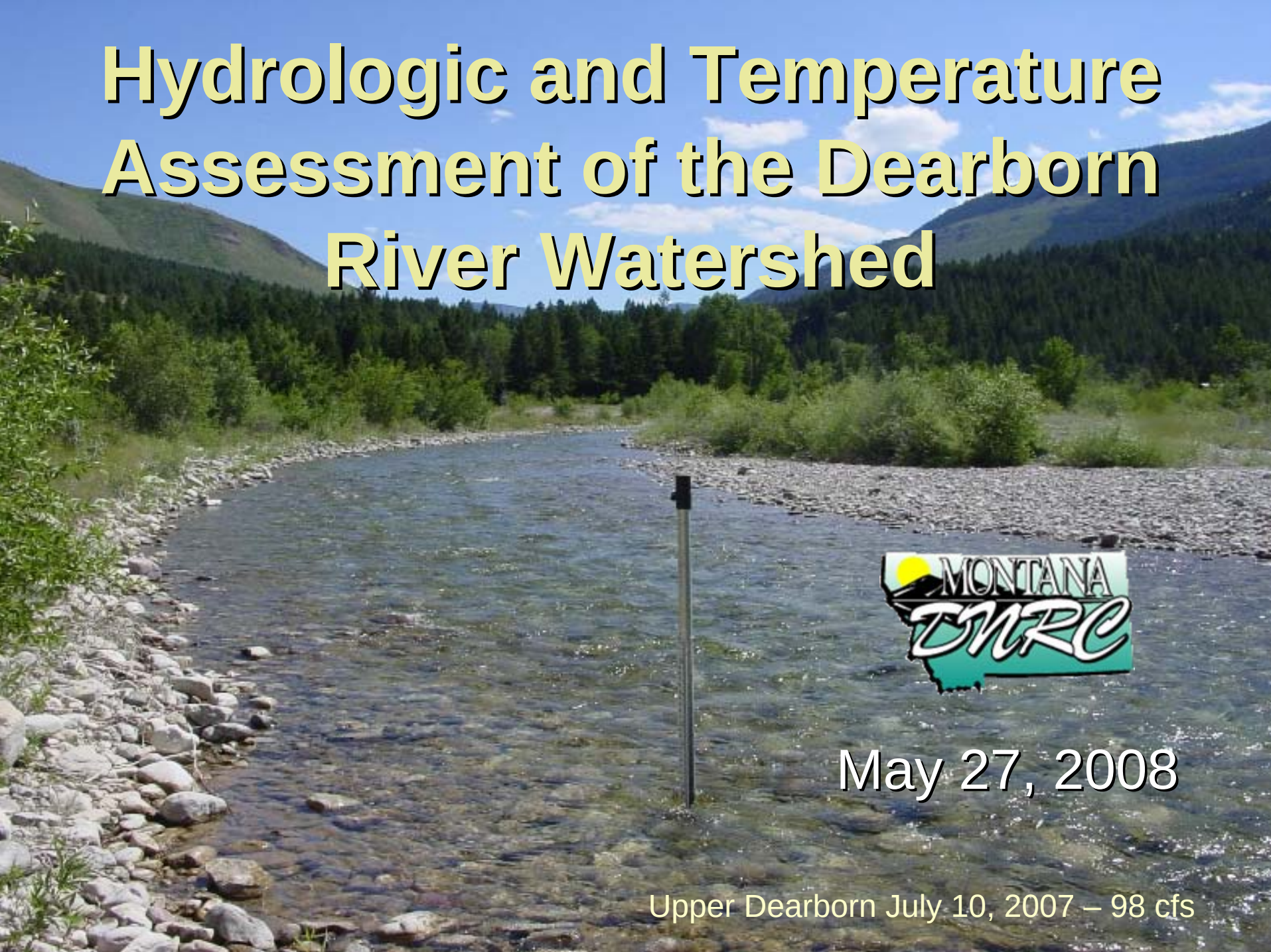
Hydrologic and Temperature Assessment of the Dearborn River Watershed



May 27, 2008

Upper Dearborn July 10, 2007 – 98 cfs

Upper Dearborn

Who We Are

- Montana DNRC-Water Management Bureau;
- Technical group responsible for management and planning activities related to Montana's water;
- Montana Department of Environmental Quality providing equipment and modeling expertise;
- Funding by DNRC and US EPA;
- Study examples.

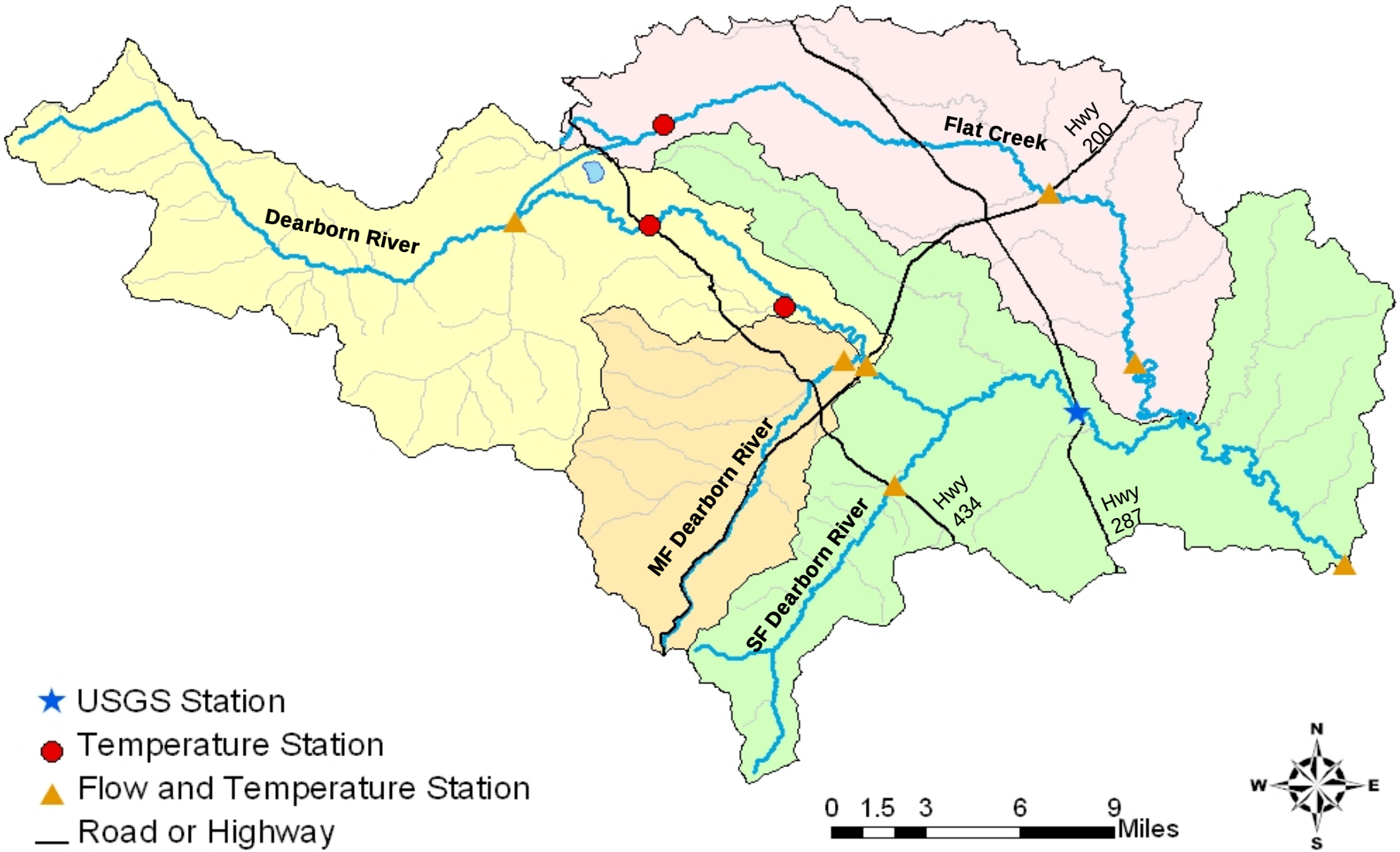
http://dnrc.mt.gov/wrd/water_mgmt/default.asp

Why study the Dearborn?

- Listed as chronically dewatered by Montana Fish Wildlife and Parks;
- Currently on Montana 303(d) list of impaired waterbodies for temperature;
- Little data to support listing;
- Only hydrologic data currently collected is at the Hwy 287 bridge;
- Determine causes of low flows and resulting higher than desirable water temperatures.

Specific Objectives

- Characterize surface water flows of the Dearborn River and its tributaries;
- Characterize water temperatures within the watershed;
- Estimate water use and potential return flows.

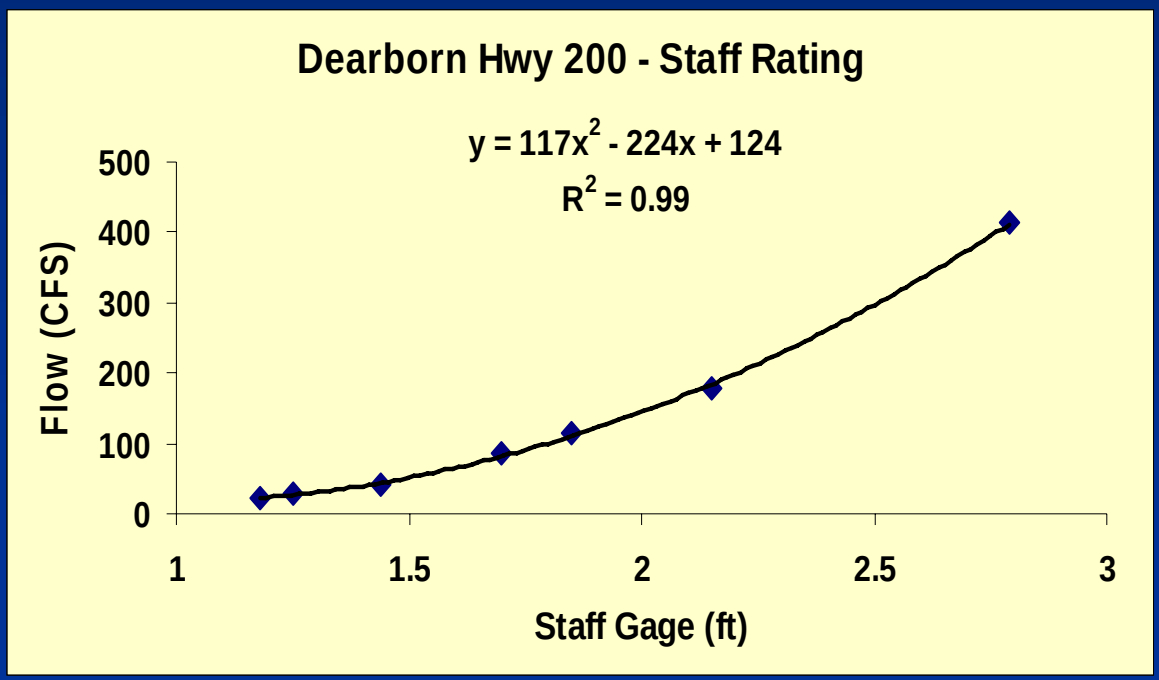

Dearborn River
Flat Creek
Hwy 200
MF Dearborn River
SF Dearborn River
Hwy 434
Hwy 287
USGS Station
Temperature Station
Flow and Temperature Station
Road or Highway
0 1.5 3 6 9
Miles
N
W
E
S

Field Sampling-Stream flow

Field Sampling-Stream flow (2)

- Continuous flow monitored at seven locations using Aquarod water level data loggers.

Date	Time	Staff (feet)	Flow (CFS)
4/17/2007	17:25	1.85	115.2
4/23/2007	13:38	2.15	177.6
6/5/2007	11:00	2.79	413
7/10/2007	11:55	1.7	85.3
8/15/2007	11:40	1.25	27.6
9/11/2007	13:10	1.18	21.6
10/16/2007	11:50	1.44	40.9



DNRC RATING TABLE

STAFF (FEET)	FLOW (CFS)	FLOW (INCHES)
1.5	51.4	2054
1.51	52.6	2106
1.52	54.0	2158
1.53	55.3	2212
1.54	56.7	2266
1.55	58.0	2322
1.56	59.5	2378
1.57	60.9	2435
1.58	62.3	2494
1.59	63.8	2553
1.6	65.3	2613
1.61	66.8	2674
1.62	68.4	2736
1.63	70.0	2799
1.64	71.6	2862
1.65	73.2	2927

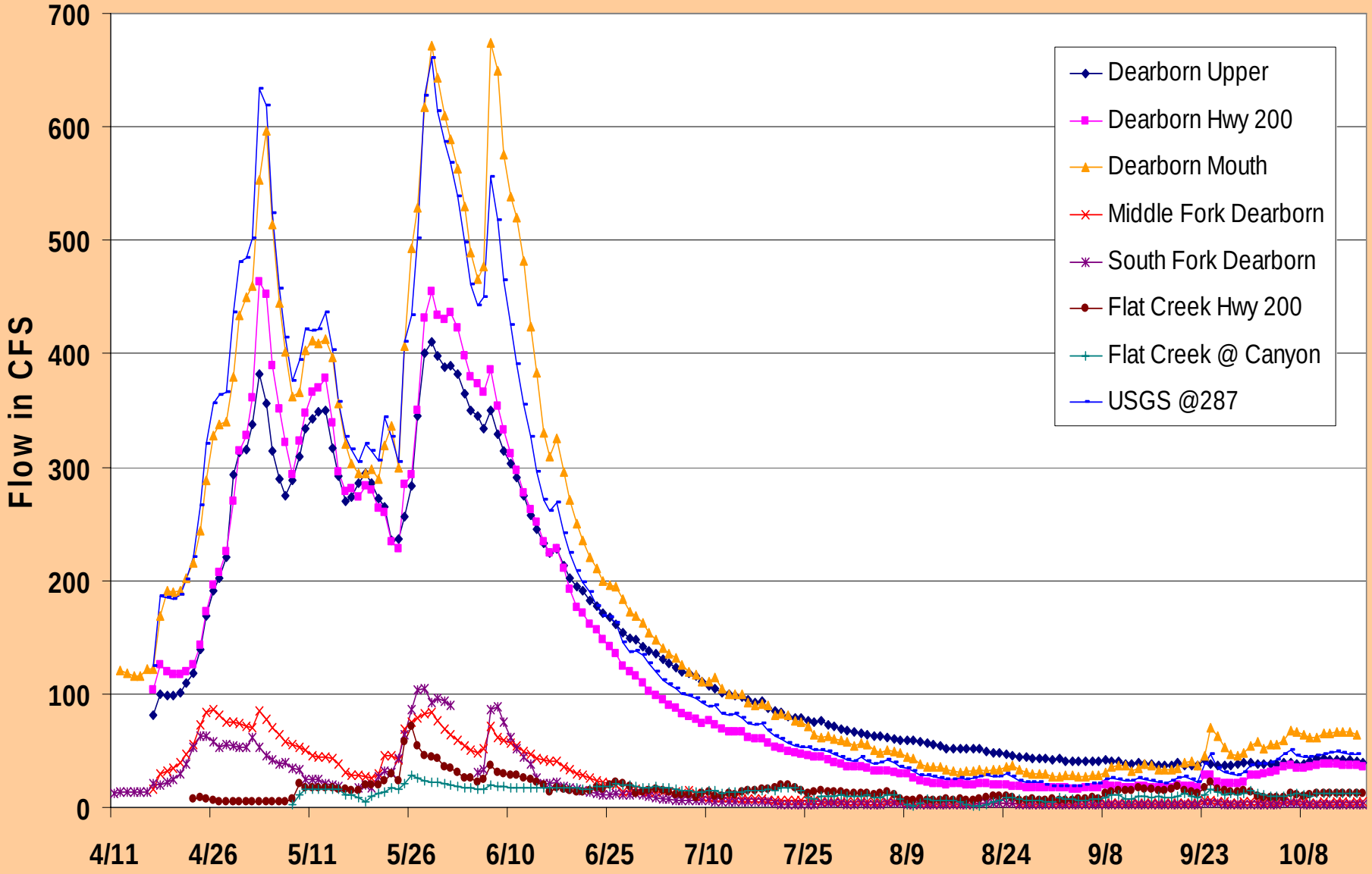
Field Sampling-Temperature

- Temperature measurements collected with data loggers;
- Monitor surface water and stream-bed water;
- 10 locations within watershed;
- Stream-bed loggers used to determine gaining or losing reaches.

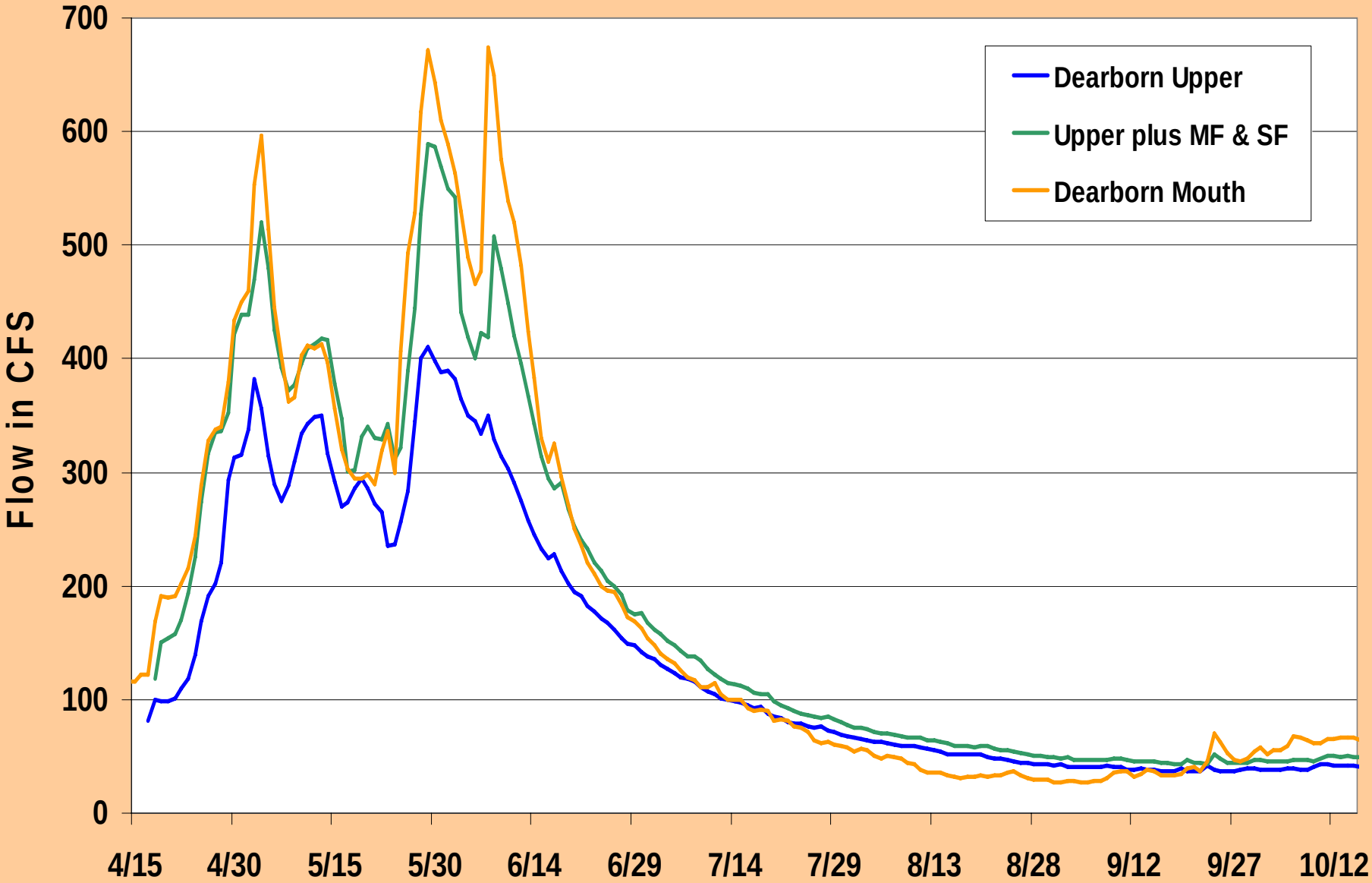
Flow Results - 2007

Dearborn River June 10, 2007 500 cfs

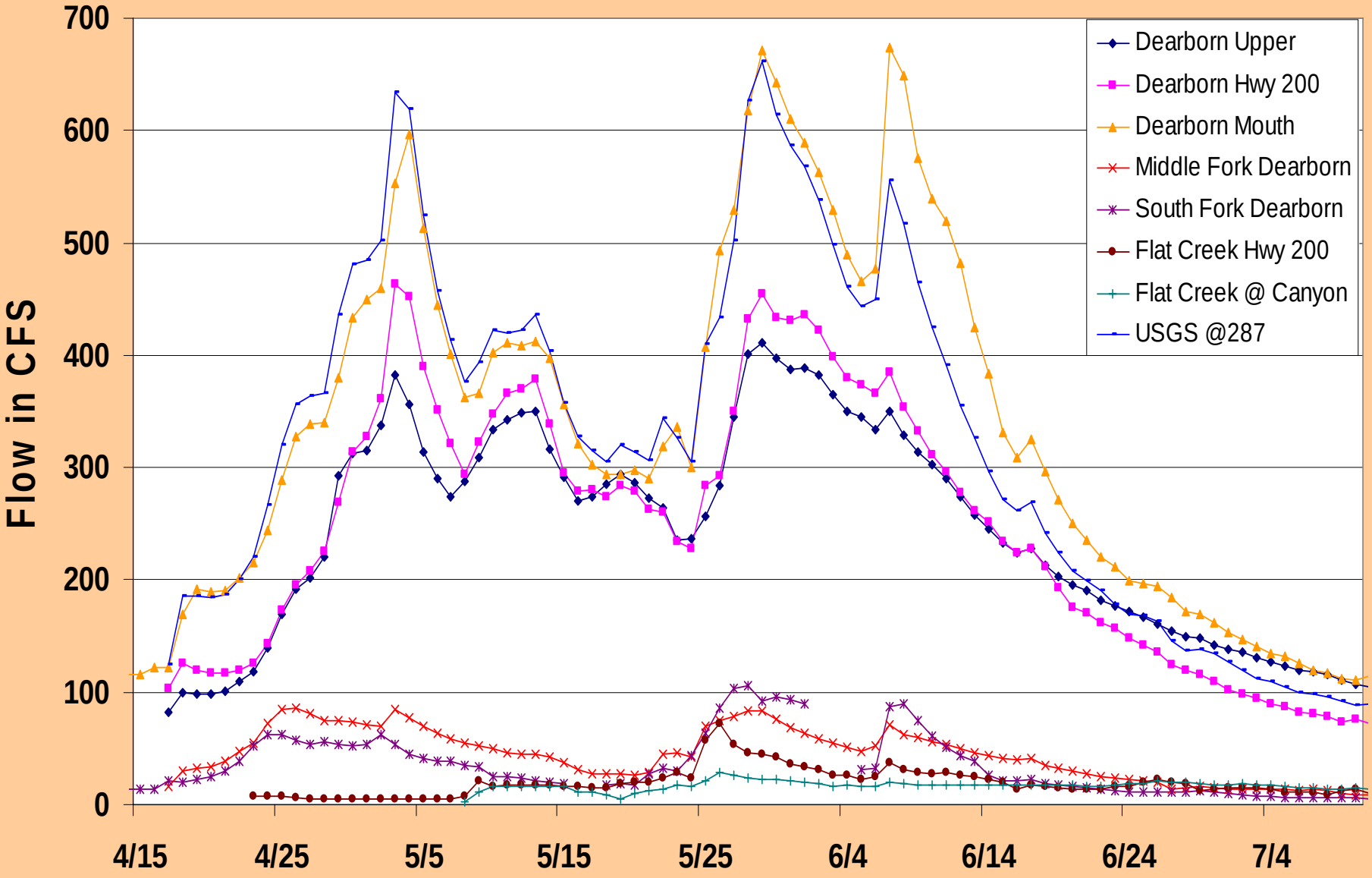
Dearborn River Flows 2007



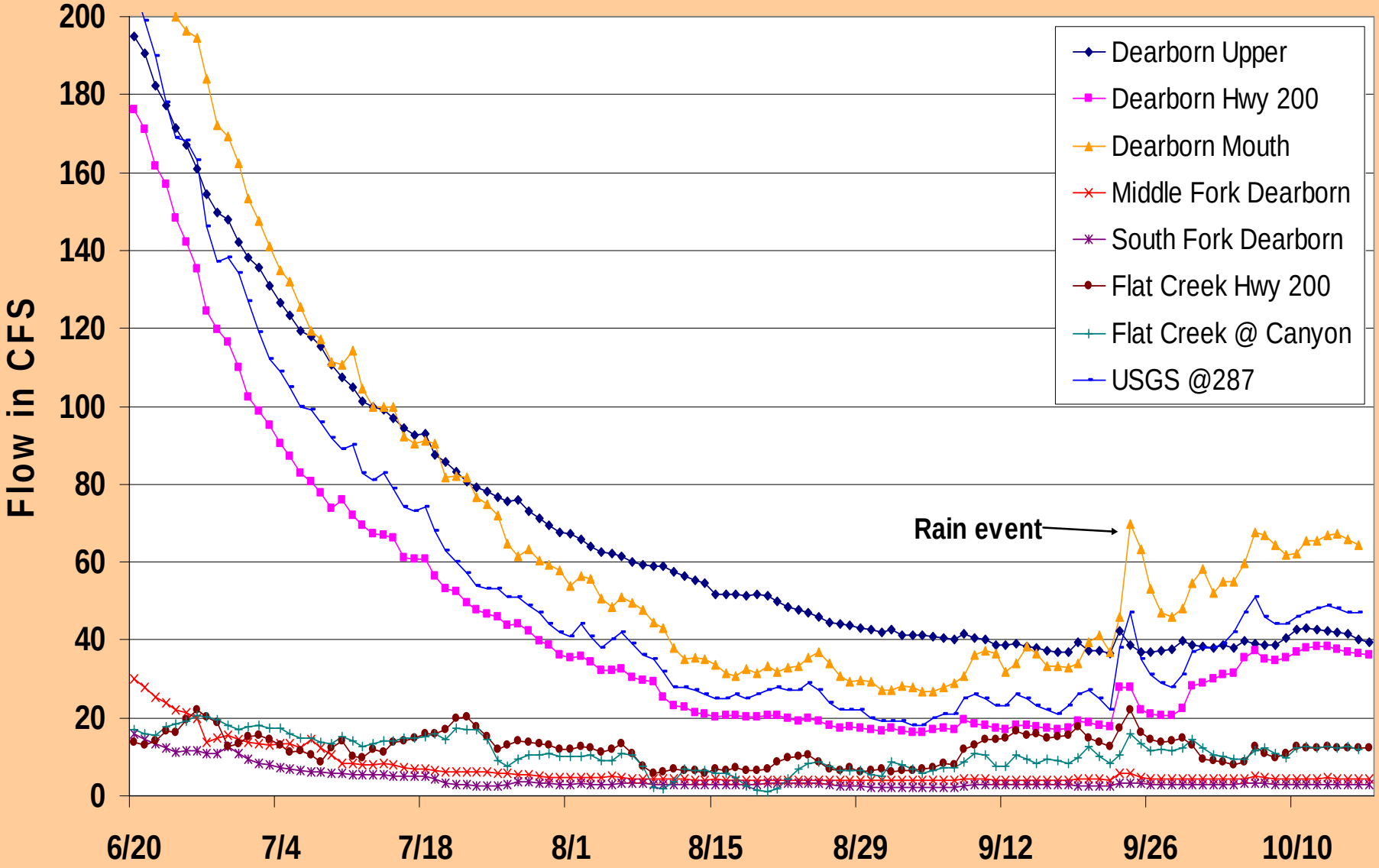
Dearborn River
Average Daily Inflows and Outflows 2007



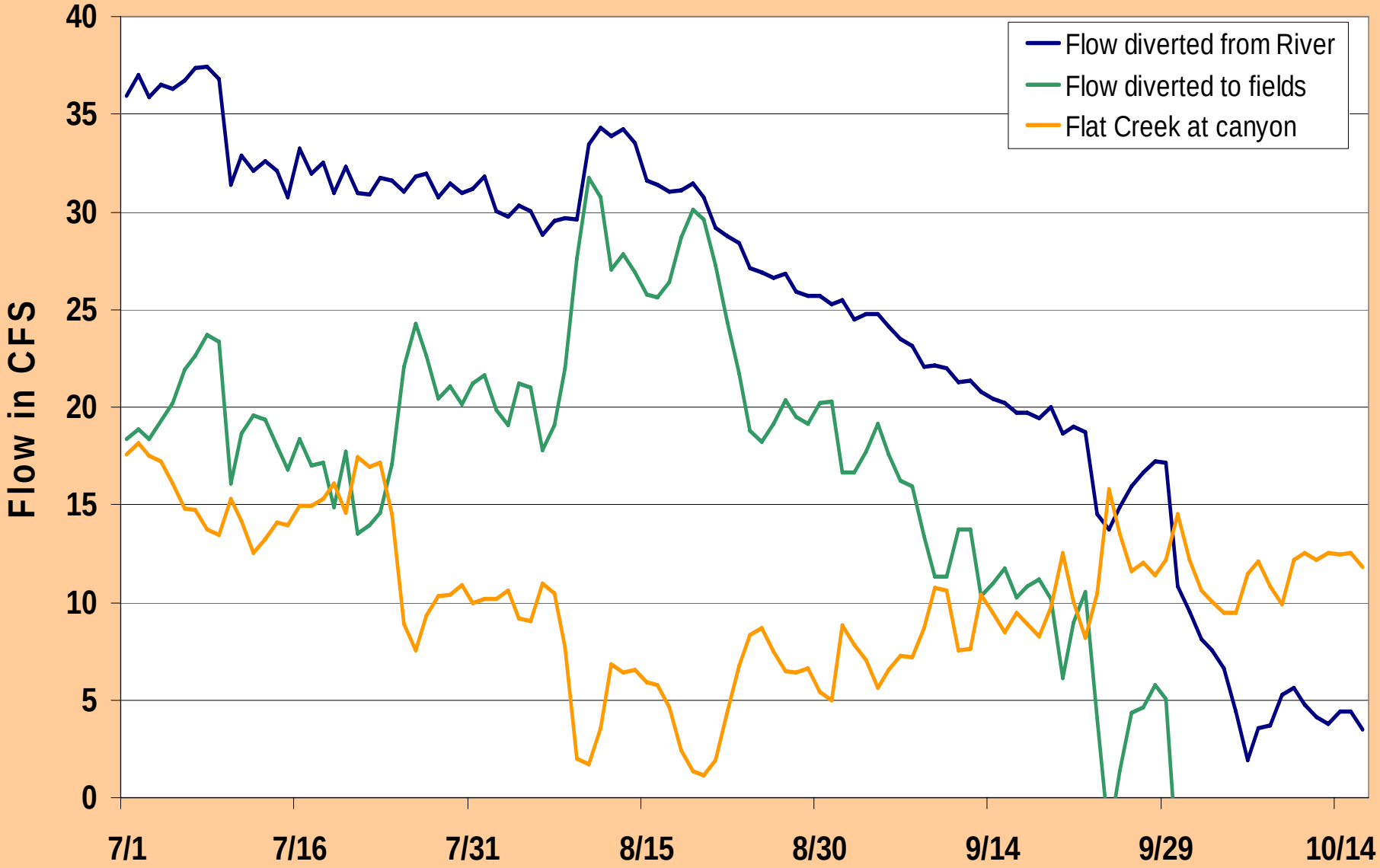
Dearborn River Early Season Flows 2007



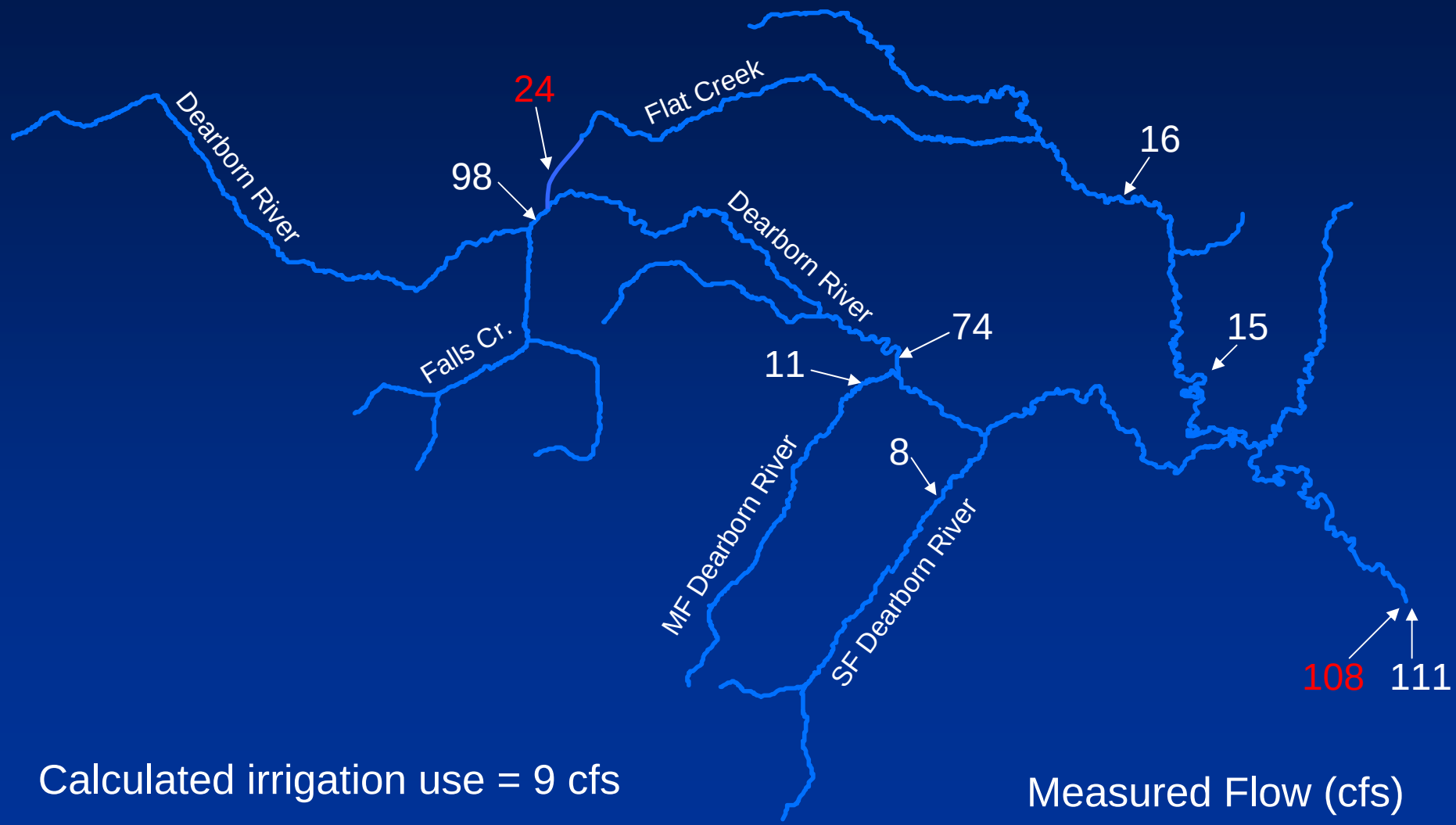
Dearborn River Summer Flows 2007



Estimated Irrigation Use 2007



Dearborn Flows July 10th, 2007

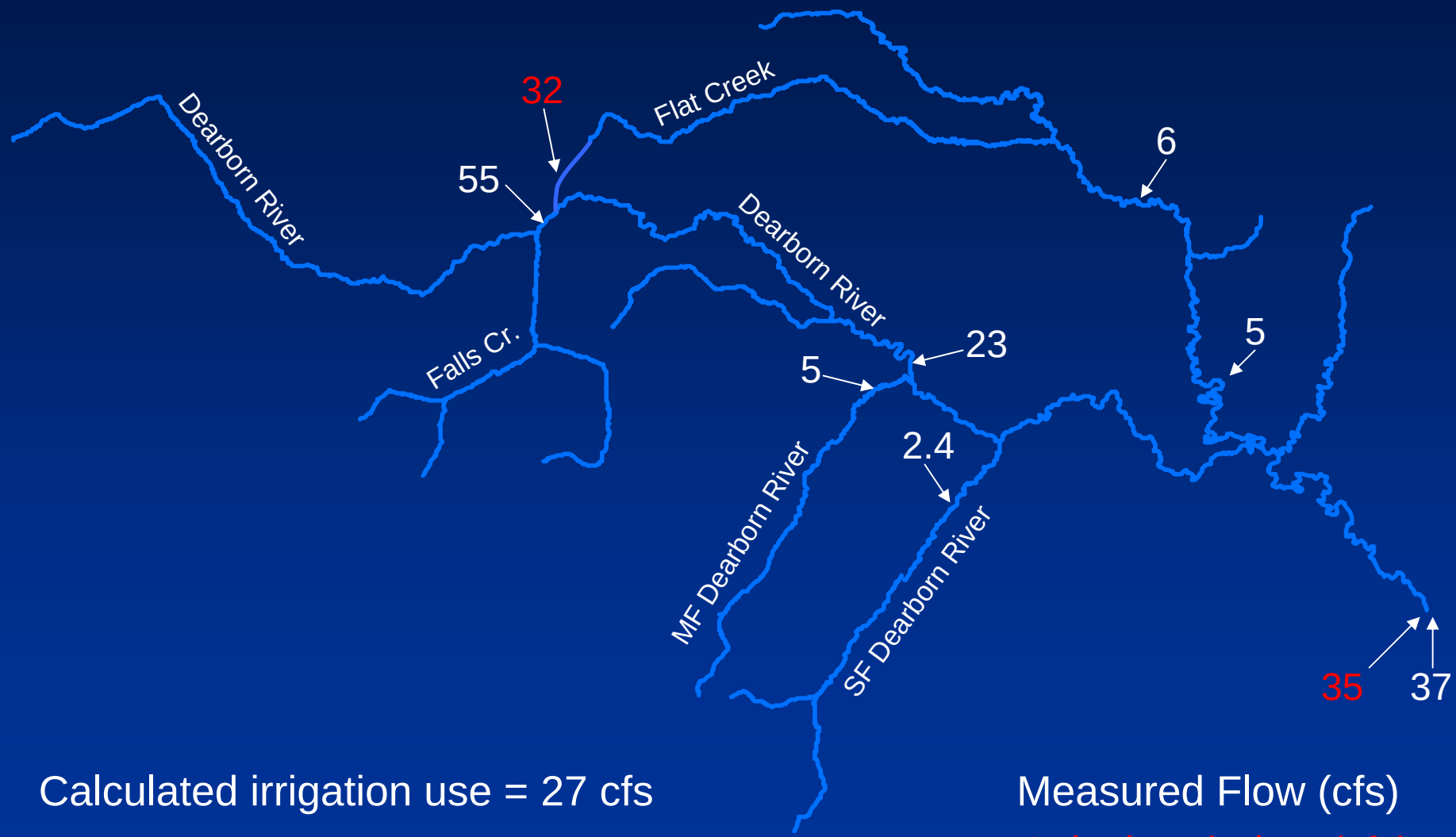


Calculated irrigation use = 9 cfs

Measured Flow (cfs)

Calculated Flow (cfs)

Dearborn Flows August 15th, 2007

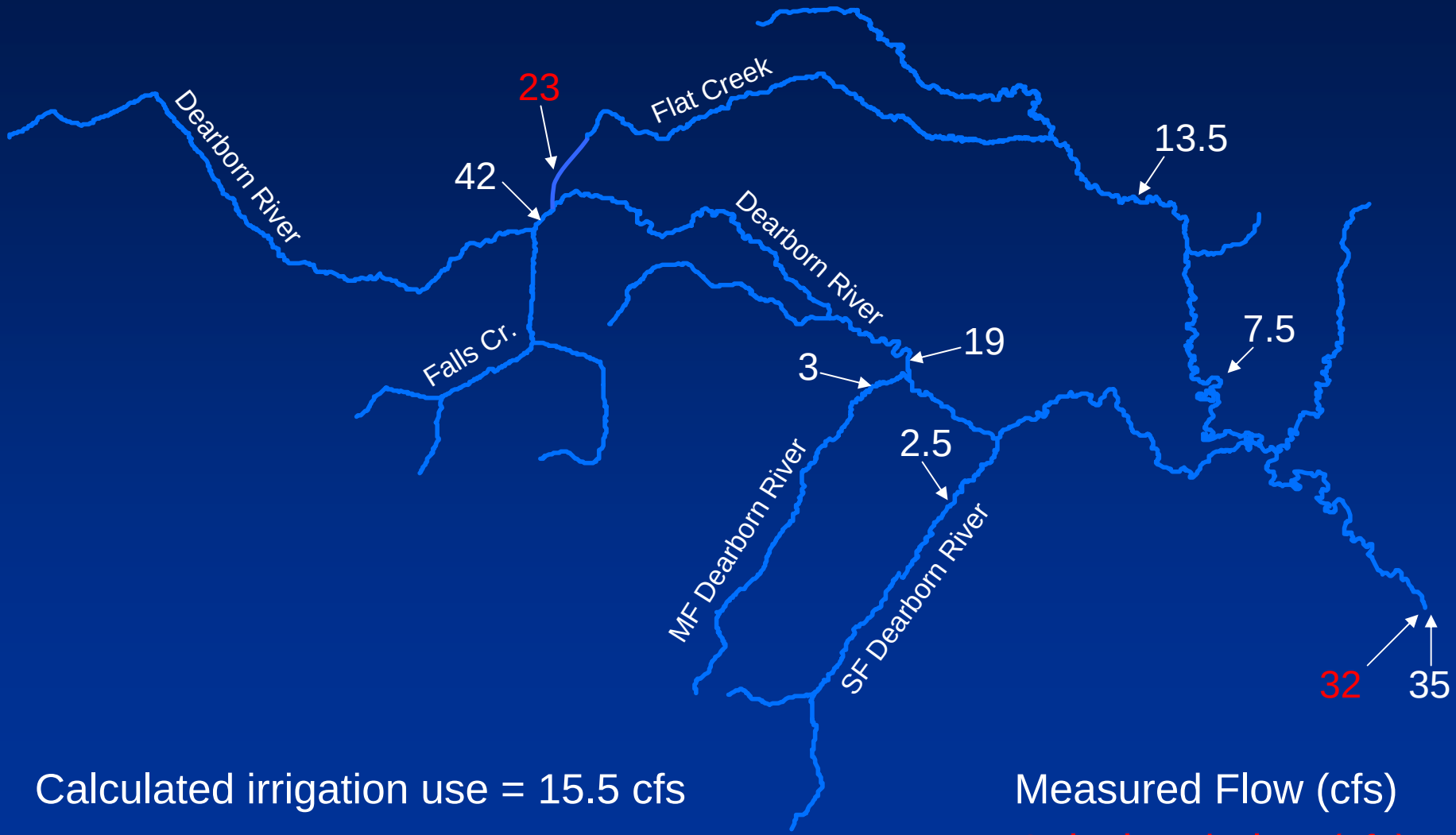


Calculated irrigation use = 27 cfs

Measured Flow (cfs)

Calculated Flow (cfs)

Dearborn Flows September 11th, 2007

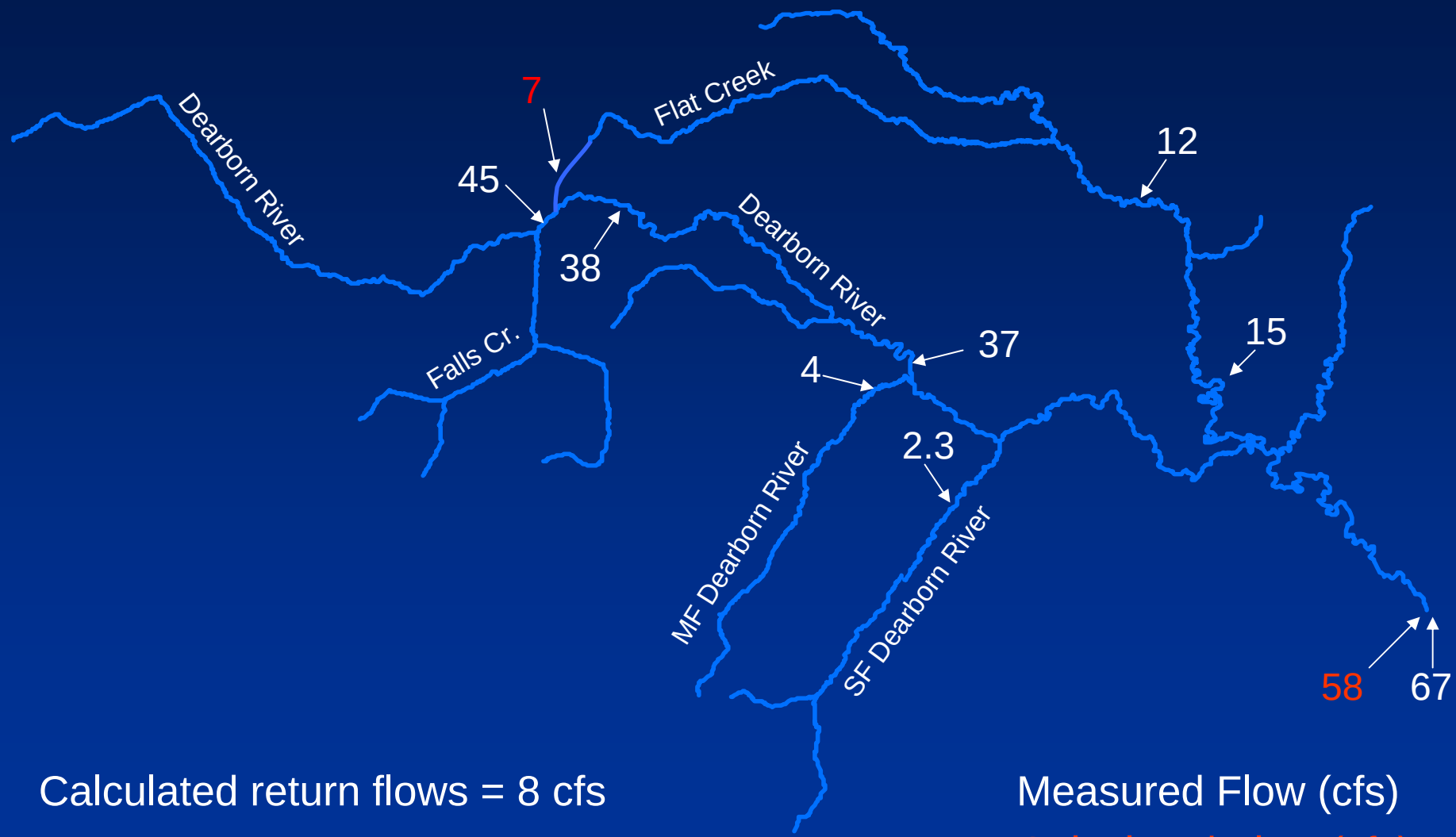


Calculated irrigation use = 15.5 cfs

Measured Flow (cfs)

Calculated Flow (cfs)

Dearborn Flows October 16th, 2007

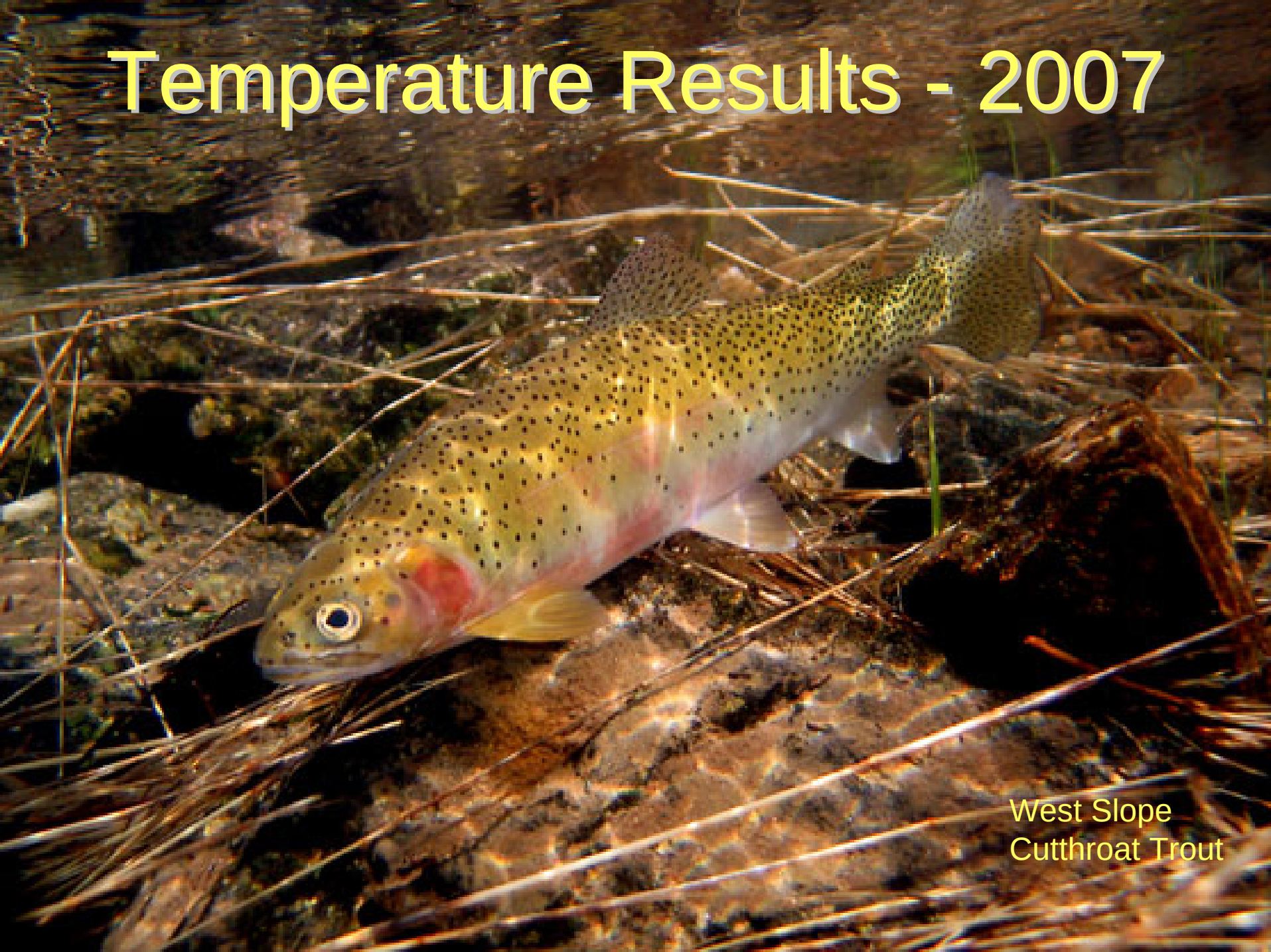


Calculated return flows = 8 cfs

Measured Flow (cfs)

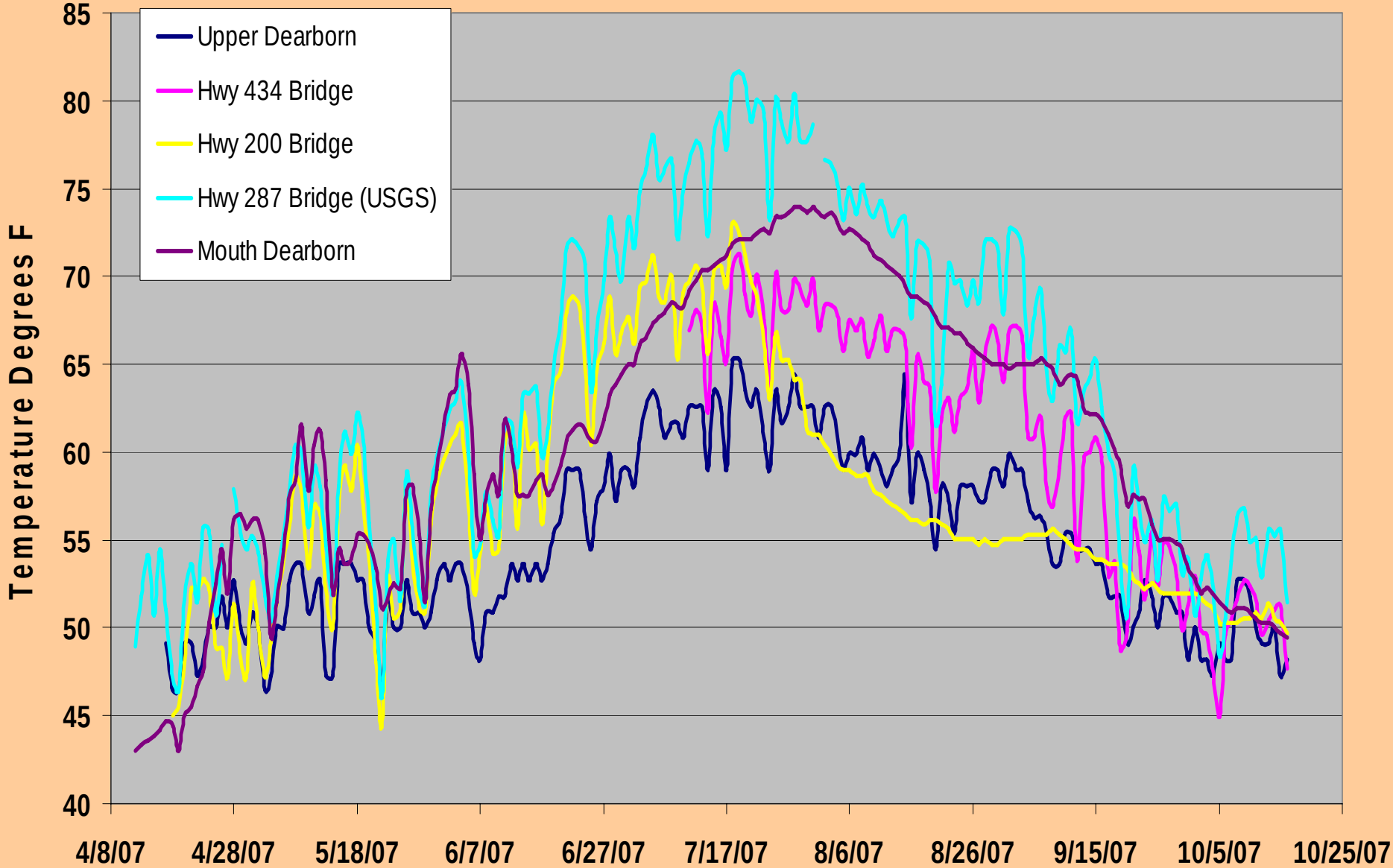
Calculated Flow (cfs)

Temperature Results - 2007

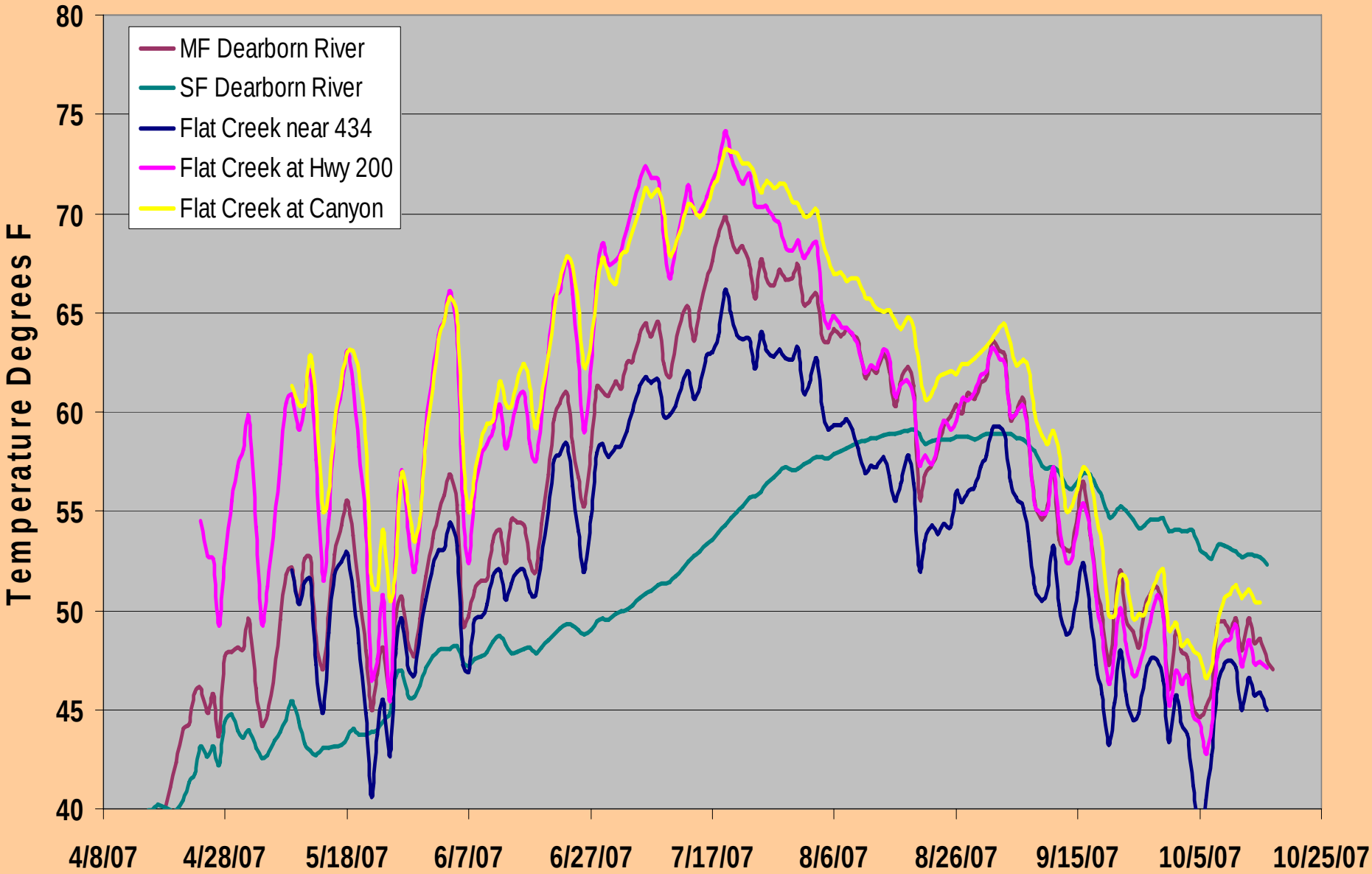


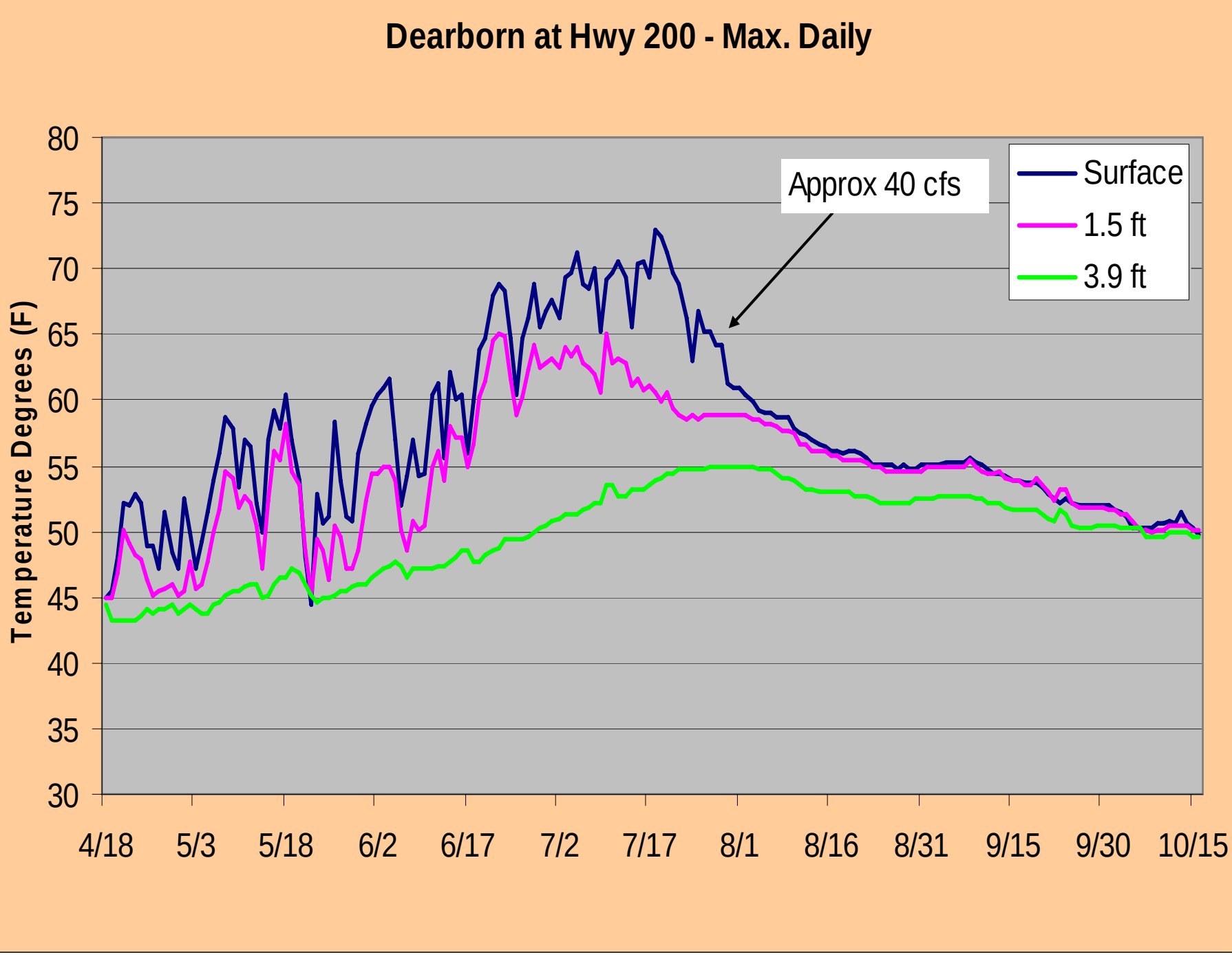
West Slope
Cutthroat Trout

Maximum Daily Surface Water Temperture Dearborn River - 2007

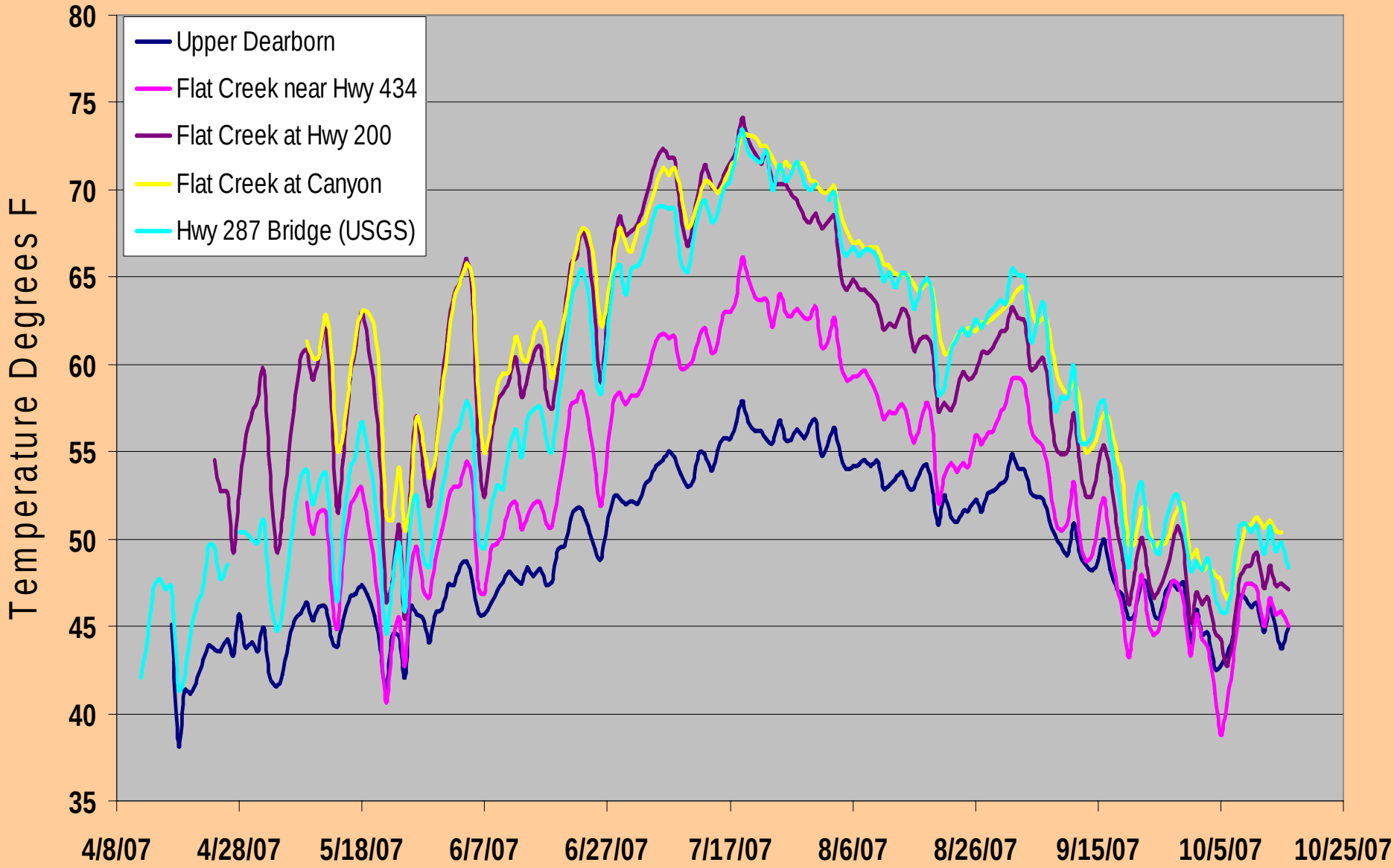


Mean Daily Surface Water Temperture Dearborn River Tributaries - 2007

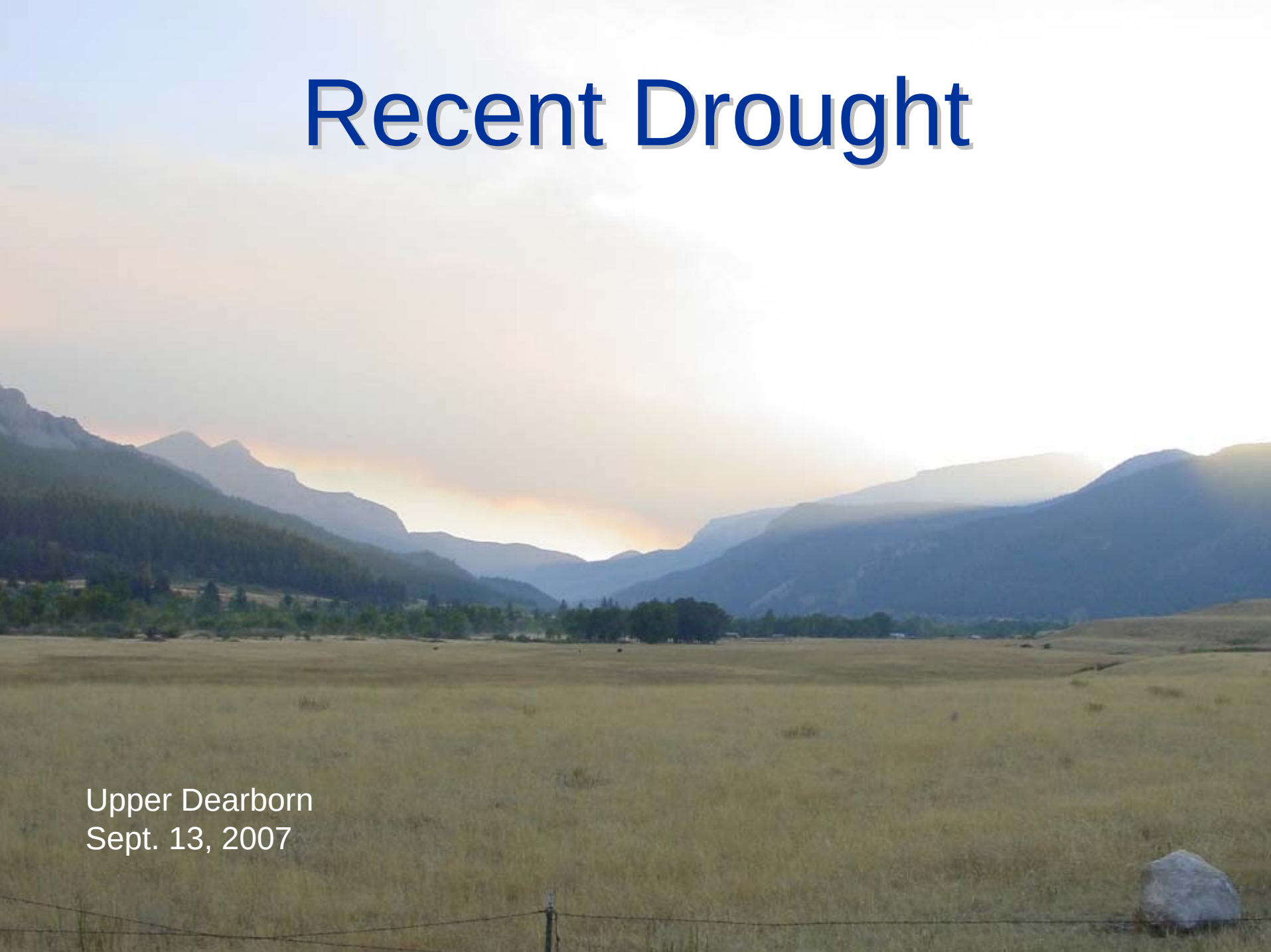



Dearborn at Hwy 200 - Max. Daily
Temperature Degrees (F)
80
75
70
65
60
55
50
45
40
35
30
4/18
5/3
5/18
6/2
6/17
7/2
7/17
8/1
8/16
8/31
9/15
9/30
10/15
Approx 40 cfs
Surface
1.5 ft
3.9 ft

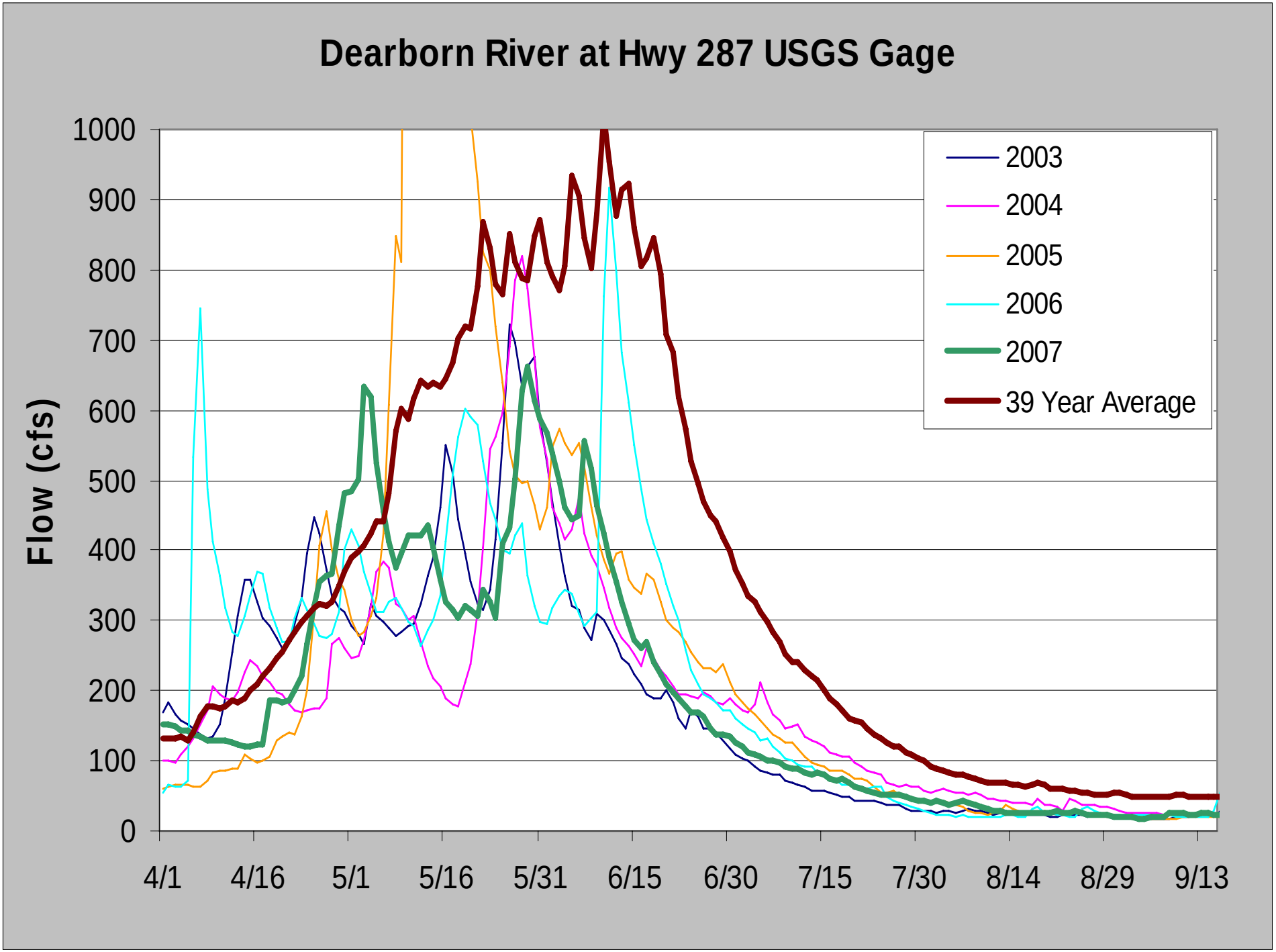
Mean Daily Surface Water Temperture Dearborn River vs Flat Creek

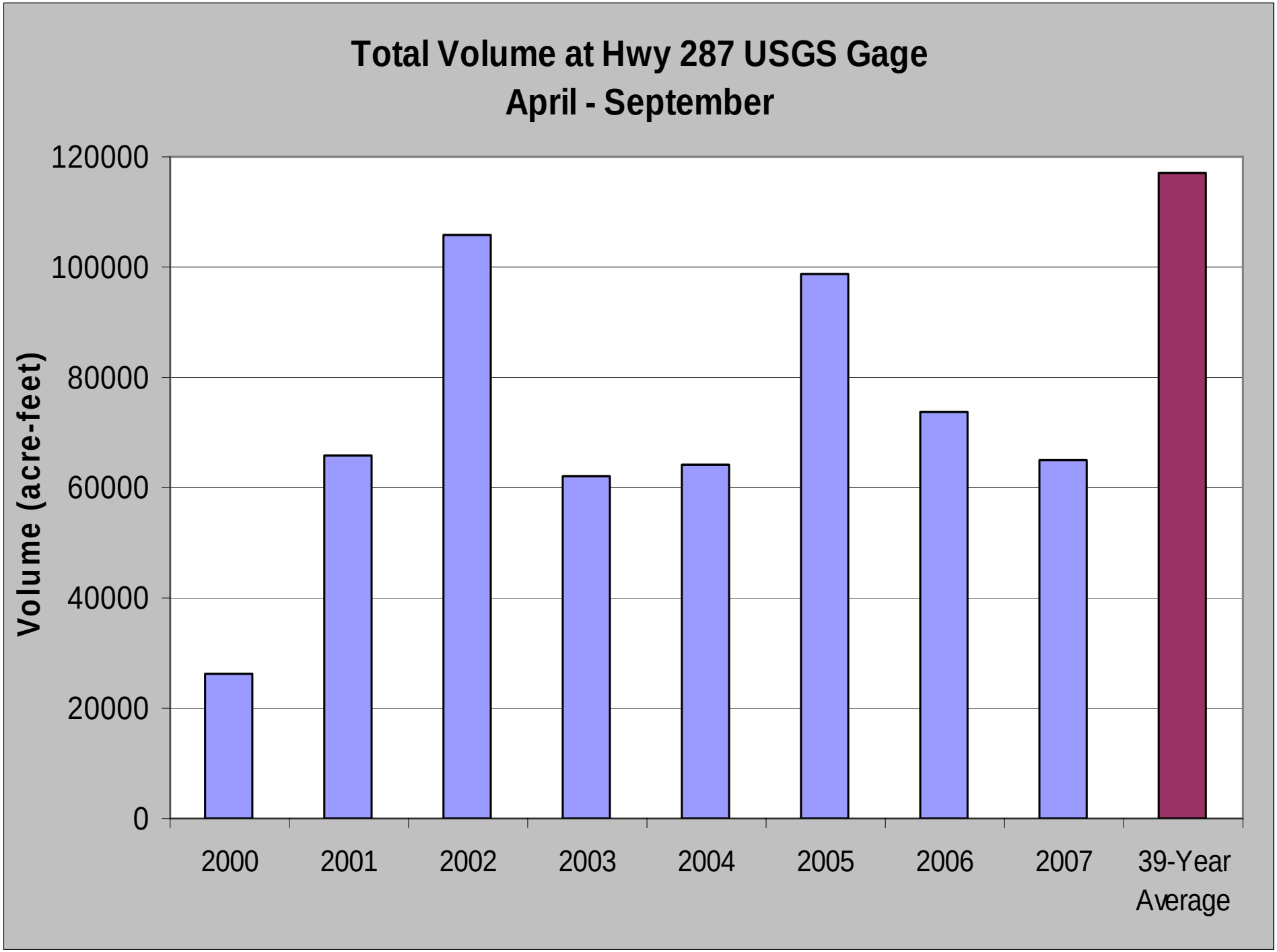


Recent Drought



Upper Dearborn
Sept. 13, 2007


Dearborn River at Hwy 287 USGS Gage
Flow (cfs)
1000
900
800
700
600
500
400
300
200
100
0
4/1
4/16
5/1
5/16
5/31
6/15
6/30
7/15
7/30
8/14
8/29
9/13
2003
2004
2005
2006
2007
39 Year Average


Total Volume at Hwy 287 USGS Gage
April - September
Volume (acre-feet)
120000
100000
80000
60000
40000
20000
0
2000
2001
2002
2003
2004
2005
2006
2007
39-Year Average

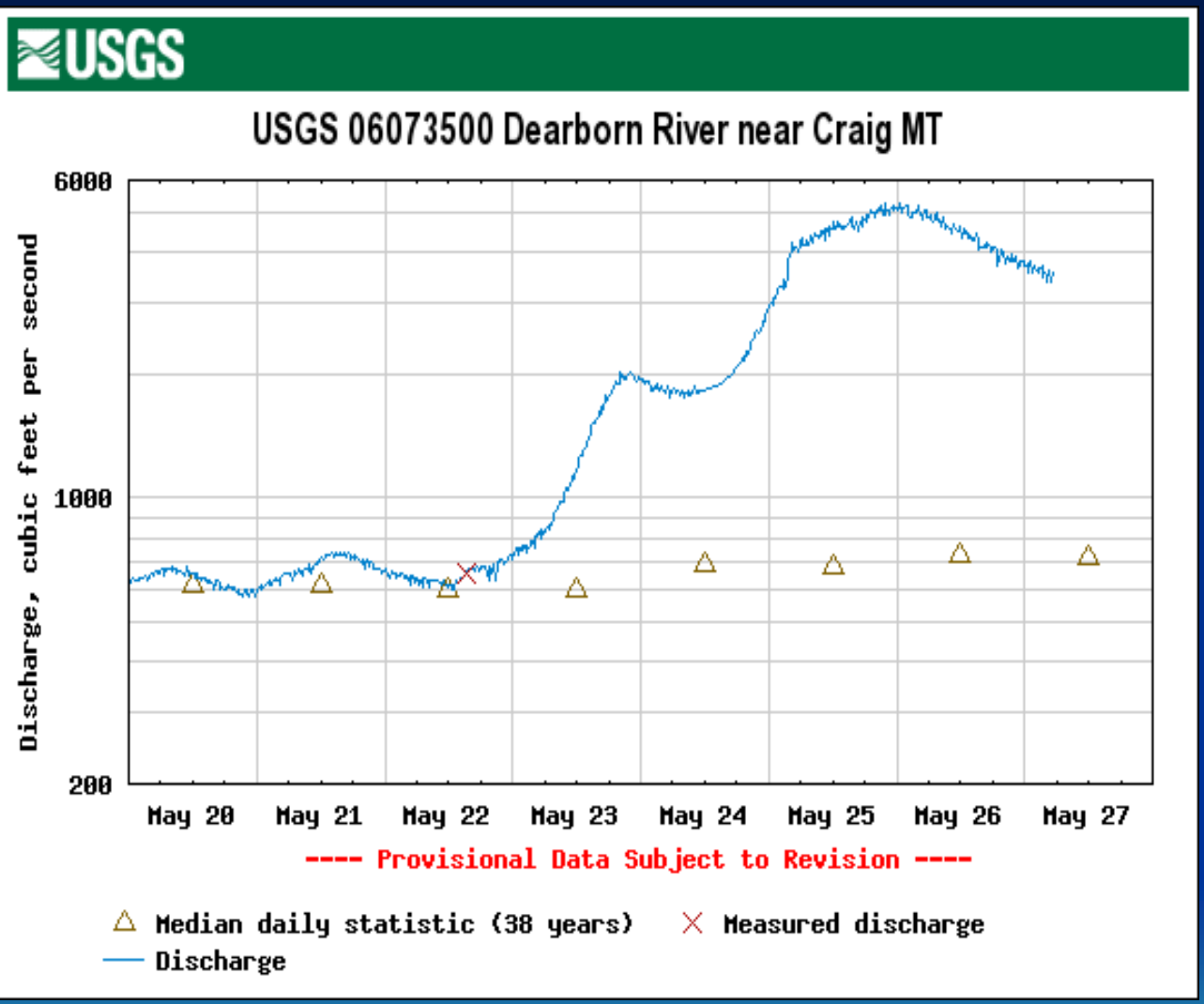
Water Supply Forecast – May 1, 2008

	<=== Drier === Future Conditions === Wetter ===>						
	========== Chance of Exceeding ==========						
	90%	70%	50%	30%	10%	30 Yr Avg	
DEARBORN RIVER at Hwy 287 (1000 AF)							
May-JUL	46	82	106	100%	130	166	121
May-SEP	52	89	115	105%	141	178	125

May – Sept 2007 = 53,500

May 23 – May 26 2008 ~ 25,000


Flood – May 2008
Dearborn River at High Bridge - Hwy 435

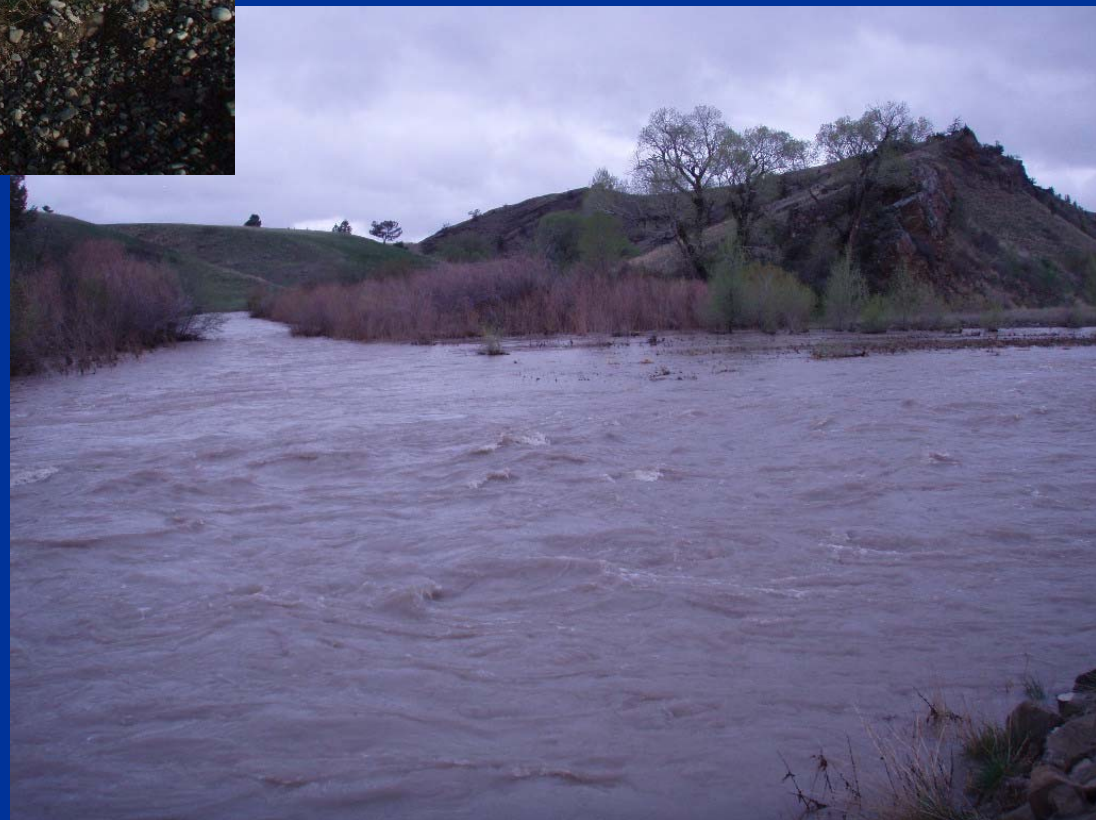


- Approx. 10 inches of rain in 4 days;
- River crested at 5,250 cfs;
- Historic floods
  1964 - 15,400
  1953 - 7,960
  1975 - 7,300
  1957 - 6,150
  2008 - 5,250

MF Dearborn Confluence

March 14, 2007

May 26, 2008



MF Dearborn Confluence

High Water 2007

High Water 2008

Dearborn Hwy 200 Bridge

SF Dearborn River

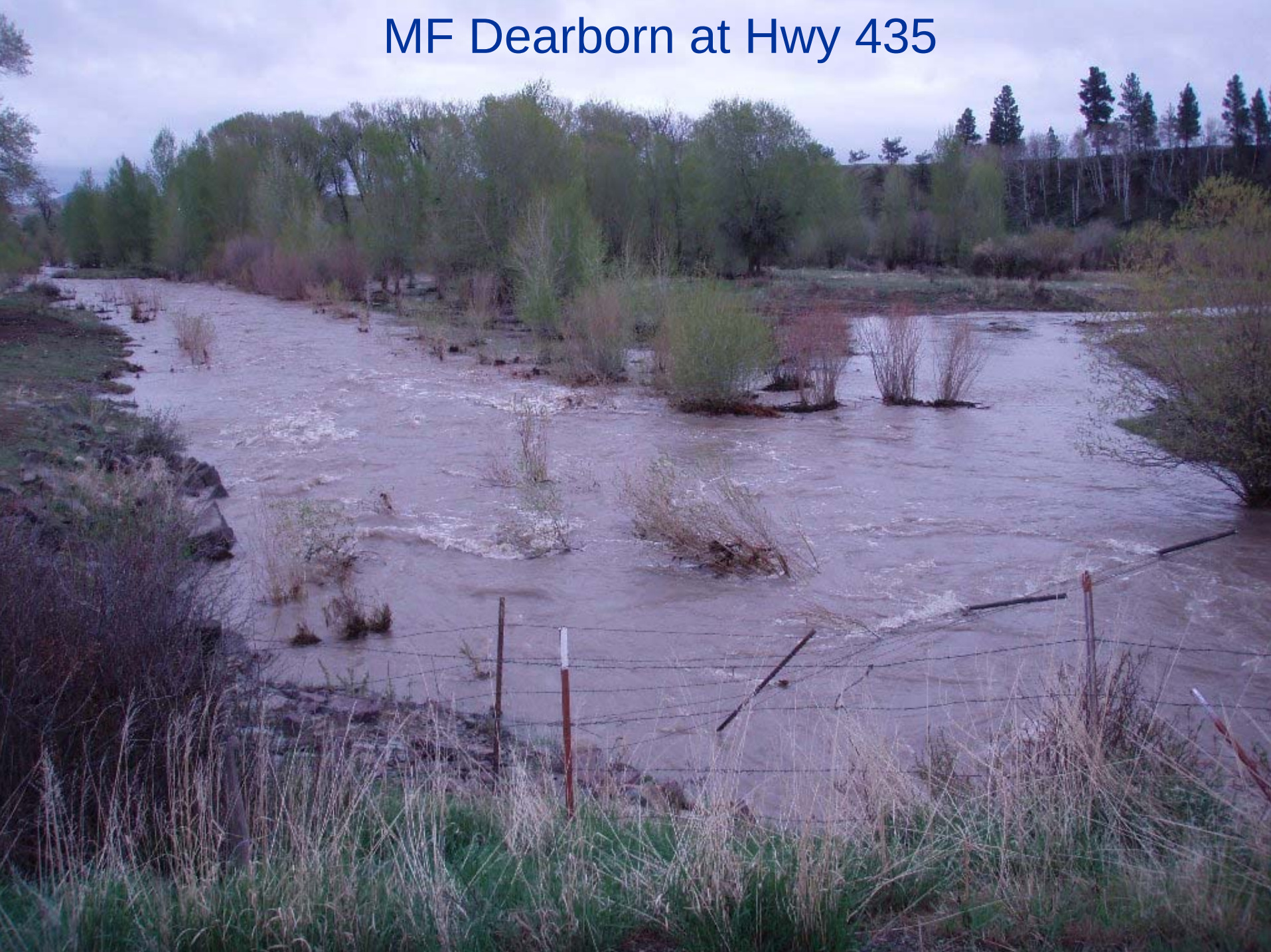
Upper Dearborn Diversion Dam

May 16, 2008

May 26, 2008

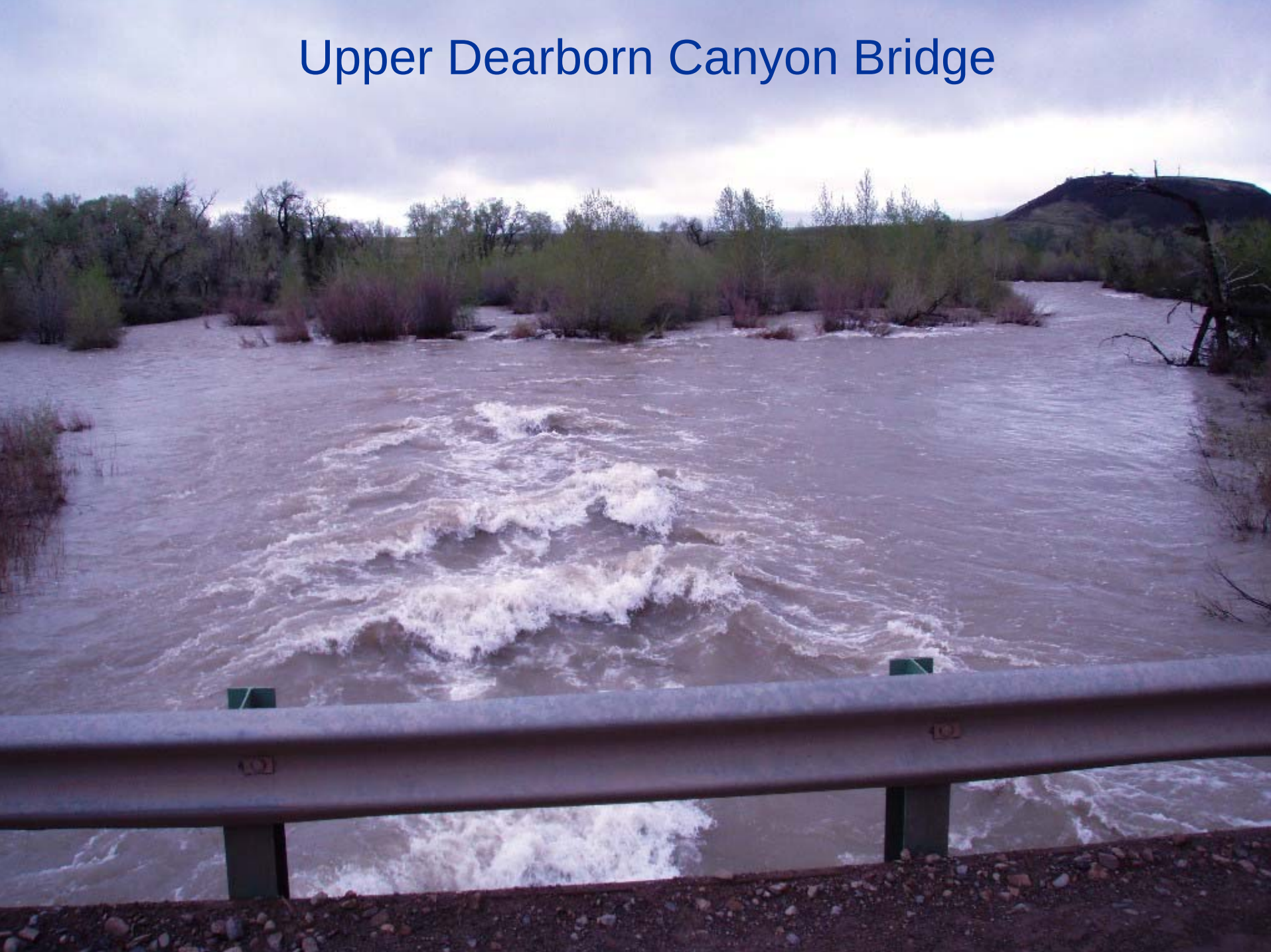

Hwy 287 Bridge
~4700 cfs

MF Dearborn at Hwy 435



Upper Dearborn

Upper Dearborn Canyon Bridge



Project Outputs

- Water balance for the entire system;
- Identification of gaining, losing, and dewatered reaches;
- Identification of reaches with increased temperatures;
- Increased awareness of potential problems and opportunities;
- Provide background information for future studies
- Annual presentations and final report.

Next Steps

- Continue stream flow and temperature monitoring in 2008 and 2009 ????;
- Expand temperature locations ????;
- Temperature data modeling by DEQ;
- Final DNRC report expected in Spring 2010.

Questions?